EPSON

New Serial Interface

#8143

Y49299167003

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INTRODUCTION

The #8143 New Serial Interface is an interface board that allows asynchronous serial data communication between a host computer and an Epson printer.

This board features:

- data communication signal levels that can be set to either RS-232C or 20mA Current Loop.
- a choice of either DTR flag or X-on/X-off handshaking protocols.
- operator selectable data word structure, including parity and word length settings (either 7 or 8 bit).
- the selection of different baud rate settings ranging from 75 to 19,200 BPS. When the printer's data buffer is disabled or when using a printer without a buffer, data transmission rate is from 75 to 9600 BPS.

This optional interface board is intended for use with the following Epson printers:

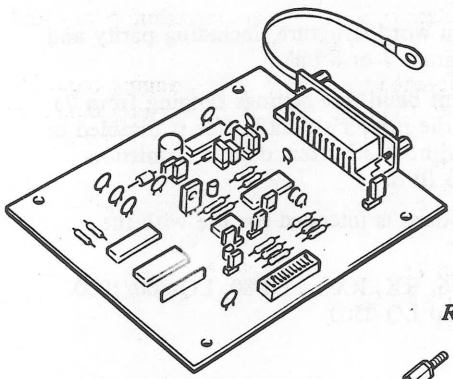
FX, FX+, JX, LX-80/86, RX, RX+, HI-80, LQ-800/1000, IX-800, EX-800/1000, and LQ-2500

About this guide

This guide is designed to give you detailed information on how to install your #8143 serial interface board in a variety of Epson printers. Installation procedures vary slightly depending upon the printer model that you have.

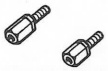
Also included in this guide are instructions on how to adjust the settings of the #8143 interface board, as well as general a description of serial data communication.

The #8143 option package contains the following items:



#8143 serial I/F board (1)

Retaining screws (4)



Optional connector lock nuts (2)

Note

When attaching the interface cable to the interface, you may find that the screws do not fit into the connector lock nuts. If this happens you will need to replace the connector lock nuts with the optional ones provided in this package.

SETTING THE CONDITIONS

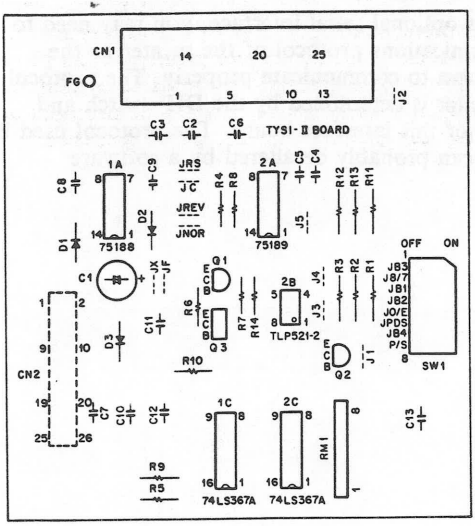
The #8143 interface board has one DIP (Dual In-line Package) switch consisting of eight individual switches, and eleven jumpers. These switches and jumpers are used for setting various conditions for serial communication.

When using this optional serial interface, you may need to alter the communications protocol of the printer or the computer for them to communicate properly. The protocol used by the printer is determined by the DIP switch and jumper settings of this interface board. The protocol used by your computer can probably be altered by a software command.

Board layout

The figure below gives you the overall board layout, including DIP switch and jumper locations.

Figure 1. Board layout



DIP switch settings

Before you install the #8143 interface board, you may need to adjust some of the settings. When making DIP switch setting changes, it is best to use a pointed device, such as a ball-point pen or small screwdriver.

Caution

All changes of DIP switch and jumper settings should be made with the printer power turned off. The printer checks and recognizes new settings only at the time the power is turned on.

About DIP switches

The set of DIP switches on the #8143 board is labelled SW 1. This set contains eight individual toggle type switches that can be set either on or off.

The following table gives you detailed information on DIP switch functions and the factory setting for each DIP switch.

Table 1. DIP switch 1 settings

DIP SW Pin No.	Function	Factory-set condition
1-1 (JB3)	Bit rate selection (See Table 2 and Table 3.)	OFF
1-2 (J8/7)	ON: 7-bit word length OFF: 8-bit word length	ON
1-3 (JB1)	Bit rate selection (See Table 2 and Table 3.)	ON
1-4 (JB2)	Bit rate selection (See Table 2 and Table 3.)	ON
1-5 (JO/E)	ON: Even parity check OFF: Odd parity check	ON
1-6 (JPDS)	ON: Parity check enabled OFF: Parity check disabled	ON
1-7 (JB4)	Bit rate selection (See Table 2 and Table 3.)	OFF
1-8 (P/S)	ON: Serial I/F is valid OFF: Parallel I/F is valid	ON

Bit rate selection

In serial data communication, data is transmitted in the form of bits. These data bits go out one at a time along a single path, and in a specified order. The BPS (Bits Per Second) rate, or speed at which these bits are transmitted, can be selected using a combination of DIP switch settings.

NOTE
In the current loop mode, normal data transfer operation cannot be guaranteed at a bit rate setting exceeding 1,200 BPS.

Bit rate selection (for printers with data buffers)
You can select bit rates from 75 to 19,200 BPS when the printer buffer is enabled. The buffer is a memory which can temporarily store data from a computer. With the buffer disabled, the available bit rates range from 75 to 9,600 BPS.

This table applies to the following printers:
FX, FX+, JX, IX-800, EX-800/1000, and LQ-2500.

Table 2. Bit rate selection

Bit Rate (BPS)	SW1-7 (JB4)	SW1-1 (PB3)	SW1-4 (JB2)	SW1-3 (JB1)
75	ON	ON	ON	ON
110	ON	ON	ON	OFF
134.5	ON	ON	OFF	ON
150	ON	ON	OFF	OFF
200	ON	OFF	ON	ON
300	ON	OFF	ON	OFF
600	ON	OFF	OFF	ON
1,200	ON	OFF	OFF	OFF
1,800	OFF	ON	ON	ON
2,400	OFF	ON	ON	OFF
4,800	OFF	ON	OFF	ON
9,600	OFF	ON	OFF	OFF
19,200	OFF	OFF	ON	ON
19,200	OFF	OFF	ON	OFF
19,200	OFF	OFF	OFF	ON
19,200	OFF	OFF	OFF	OFF

Bit rate selection (for printers without buffers, or during buffer disabled operation)

The bit rates available on these printers range from 75 to 9,600 BPS.

This table applies to the LX, RX, RX+, HI-80, and LQ-800/1000 printers. It will also apply to printers whose print buffers have been disabled.

Table 3. Bit rate selection

Bit Rate (BPS)	SW1-7 (JB4)	SW1-1 (PB3)	SW1-4 (JB2)	SW1-3 (JB1)
75	ON	ON	ON	ON
110	ON	ON	ON	OFF
134.5	ON	ON	OFF	ON
150	ON	ON	OFF	OFF
200	ON	OFF	ON	ON
300	ON	OFF	ON	OFF
600	ON	OFF	OFF	ON
1,200	ON	OFF	OFF	OFF
1,800	OFF	ON	ON	ON
2,400	OFF	ON	ON	OFF
4,800	OFF	ON	OFF	ON
9,600	OFF	ON	OFF	OFF
300	OFF	OFF	ON	ON
1,200	OFF	OFF	ON	OFF
2,400	OFF	OFF	OFF	ON
9,600	OFF	OFF	OFF	OFF

Data word structure

The structure of the data word is also operator selectable by adjusting the DIP switch settings (see *Table 1.* for these settings). The word structure for serial data is:

1 start bit + 7 or 8 data bits (selectable) + 1 Even or Odd parity bit (optional) + 1 or more stop bits.

The table below shows the possible word structure combinations.

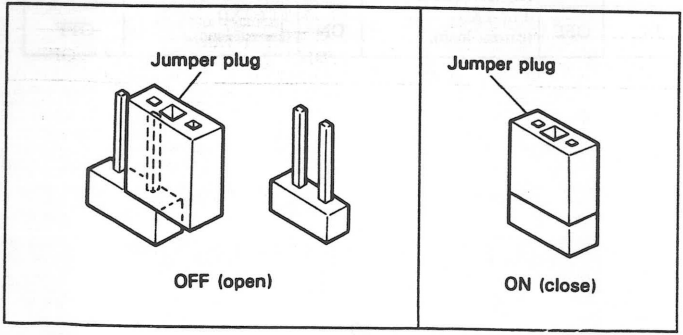
Table 4. Word structure

Start Bit	Data Bit	Parity Bit	Stop Bit
1	7	No parity	1 or more
1	7	Odd parity	1 or more
1	7	Even parity	1 or more
1	8	No parity	1 or more
1	8	Odd parity	1 or more
1	8	Even parity	1 or more

Jumpers

The jumper is a small terminal used for connecting or disconnecting a circuit. The jumper is ON when the jumper plug covers both wires of the terminal. Jumper settings can be changed by either attaching or removing the rectangular jumper plug. If the jumper is to be turned OFF, connect it to just one of the two terminal pins as shown in the figure below. By doing this, you can avoid losing the unused jumper plug.

Figure 2. Jumpers



Jumper settings

The table below gives you information about the interface conditions that can be selected using jumper switches. In all cases, ON denotes the connection of the jumper (covering both terminals), while OFF denotes the disconnection of the jumper.

Table 5. Jumper settings

Jumper	Function				Factory-set condition
J1	ON: Pull up "TTY-TXD" to +12V via 470Ω resistor.				OFF
J2	ON: Connect "TTY-TXD Return" to Signal Ground.				OFF
J3	ON: Pull up "TTY-RCD" to +12V via 470Ωresistor.				OFF
J4	ON: Connect "TTY-RXD Return" to Signal Ground.				OFF
J5	ON: Pull up "DSR" and "DCD" to +12V via 4.7kΩ resistor.				ON
JRS	ON	Input data: RS-232C level	OFF	Input data: Current loop level	ON
JC	OFF		ON		OFF
JNOR	ON	In this state serial data entry is disabled. DTR=MARK (RS-232C) TTY-TXD=MARK (Current Loop)	OFF	In this state serial data entry is disabled. DTR=SPACE (RS-232C) TTY-TXD=SPACE (Current Loop)	ON
JREV	OFF		ON		OFF
JF	ON	A reverse channel flag is output to TTY-TXD (current loop).	OFF	An X-on/X-off signal is output to TTY-TXD (current loop).	ON
JX	OFF		ON		OFF

DATA ENTRY

This section gives a brief description of serial data communication conditions and handshaking protocols supported by the #8143 interface board.

Serial communication

The #8143 interface allows you to select either RS-232C or 20 mA current loop signal levels for data communication, but never both at the same time.

This interface board also provides for either DTR (Data Terminal Ready) or X-on/X-off handshaking protocol. X-on/X-off handshaking is only available for printers that have print buffers (memory).

Note
Printers that are capable of X-on/X-off protocol with the #8143 I/F board are: FX,FX+,JX-80,LQ-800/1000, EX-800/1000,IX-800 and LQ-2500

Handshaking protocol

X-on/X-off protocol

X-on/X-off protocol is a system in which the printer transmits a code to the computer to indicate that it cannot accept more data, and a second code when it is once again ready.

The printer sends an X-on (11h) code when it is ready to receive data, and an X-off (13h) when it is busy. The X-on/X-off signals may be transmitted from the TXD terminal (for an RS-232C interface) or through the TTY-TXD terminal (for a current loop interface). X-on/X-off protocol can only be used by printers equipped with data buffers (enabled).

DTR protocol

This interface board provides for DTR handshaking protocol using either RS-232C or Current Loop signal levels.

These handshaking descriptions apply during the following conditions:

- jumper JNOR is set to ON.
- jumper JREV is set to OFF.

RS-232C signal level:
Under this system, when the printer is turned on the DTR enters the SPACE state, meaning that data entry is enabled. Once the vacant area for transmitted bytes drops to a certain level, the DTR enters the MARK state, causing data entry to be disabled. After this transmitted data has been transferred to the printer, and the vacant area for bytes increases, the DTR Channel enters the SPACE state and data entry is again enabled.

Current Loop signal level:
When the printer is turned on the TTY-TXD (Current Loop) enters the SPACE state (High impedance) enabling data entry. Once the vacant area for bytes drops to a certain level, the TTY-TXD signal switches to the MARK state (Low impedance), causing data entry to be disabled. After the transmitted data has been transferred to the printer, the impedance level switches to the SPACE state (High impedance) and data entry is once more enabled.

NOTE
In the current loop mode, normal data transfer operation cannot be guaranteed at a bit rate setting exceeding 1,200 BPS.

SPECIFICATIONS

1. Synchronizing Method: Asynchronous
2. Bit Rate: 75, 110, 134.5, 150, 200, 300, 600, 1200, 1800, 2400, 4800, 9600, 19200 BPS (operator selectable)
3. Word length:
   - Start bit: 1 bit
   - Data bit: 7 or 8 bits (operator selectable)
   - Parity bit: Odd, even or none (operator selectable)
   - Stop bit: 1 bit or more
4. Input signal polarity:
   - 1) With RS-232C: MARK = logic "1" (−3 to −27V)
     SPACE = logic "0" (+3 to +27V)
   - 2) Current loop: MARK = logic "1" (Current ON)
     SPACE = logic "0" (Current OFF)

5. Handshaking

Table 6. Handshaking

	RS-232C	Control Loop
Using DTR	When the signal condition at pin No. 11 and pin No. 20 is: MARK: Data transfer is disabled. SPACE: Data transfer is enabled. (The signal polarity can be inverted by jumper setting.)	When the impedance between pin No. 17 and pin No. 24 is: Low (MARK): Data transfer is disabled. High (SPACE): Data transfer is enabled. (The signal polarity can be inverted by jumper setting)
Using X-ON/X-OFF signals*	Data is transmitted from pin No. 2. X-ON <11>H: Data entry is enabled. X-OFF <13>H: Data entry is disabled.	Data is transmitted by the change of the impedance between pin No. 17 and pin No. 24. X-ON <11>h: Data entry is enabled. X-OFF <13>h: Data entry is diabled.

* Signal polarity can be inverted.

Note

Operation is not guaranteed when using the current loop mode at rates over 1200 BPS.

HARDWARE DESCRIPTION

(1) I/F board connector: EIA standard 25-pin Cannon type
(2) For signal description and pin assignment, refer to the table below:

Table 7. Signal description and pin assignment

Pin No.	Signal Name	Direction*	Desription
1	Protective Ground (GND)	—	Connected to FASTON tab terminal for chassis ground.
2	TXD (RS-232C)	OUT	Transmitted data (RS-232C level). Output serial data from the printer is transmitted after level conversion.
3	RXD (RS-232C)	In	Received data (RS-232C level). Received data from the host computer is transmitted to the printer after level conversion.
4,5	Unused	—	
6	DSR	In	After connection to DCD (pin No. 8), this signal is level converted and sent to the SLCT IN terminal of the controller.
7	Signal GND	—	
8	DCD	In	Connected to DSR (pin No. 6)
9, 10	Unused	—	
11	Reverse channel (=2nd RTS)	Out	Flag signal for handshaking. This signal indicates to the host computer whether or not data input to the serial interface is permitted. The user can invert the polarity of this signal by the internal jumper. After level conversion of controller BUSY, this signal is output. This pin is connected to DTR (pin No. 20) at the output side.
12—16	Unused	—	

Pin No.	Signal Name	Direction*	Desription
17	TTY-TXD	Out	Pin Nos. 17 to 24 are used for signal output of current loop data, for signal output of handshaking status or TXD output signal according to the jumper setting.
18, 19	Unused	—	
20	DTR	In	Connected to Reverse Channel (pin No. 11)
21, 22	Unused	—	
23	TTY-RXD return	In	Return signal fo TTY-RXD (pin No. 25)
24	TTY-TXD return	Out	Return signal of TTY-TXD (pin No. 17)
25	TTY-RXD	In	Input data of serial current loop.

INSTALLATION

The #8143 interface board is designed to be installed inside the printer. Installation or removal of the interface board is easy, and requires only a cross-head type screwdriver.

The following section gives you detailed information on how to install your interface board in a variety of Epson printers. Installation procedures vary slightly depending upon the model of printer that you have.

Caution
Avoid touching the printer's circuit board contacts, as many of these components are sensitive to static electric charges that may build up on your body.

FX series, FX+ series, and JX-80 printer

Caution
Turn off the power to the printer and the computer before installing the serial interface. Make sure that all power and interface cables are removed.

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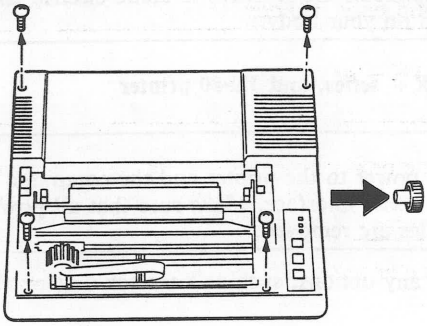
1. Remove any options, such as a tractor unit or cut-sheet feeder.

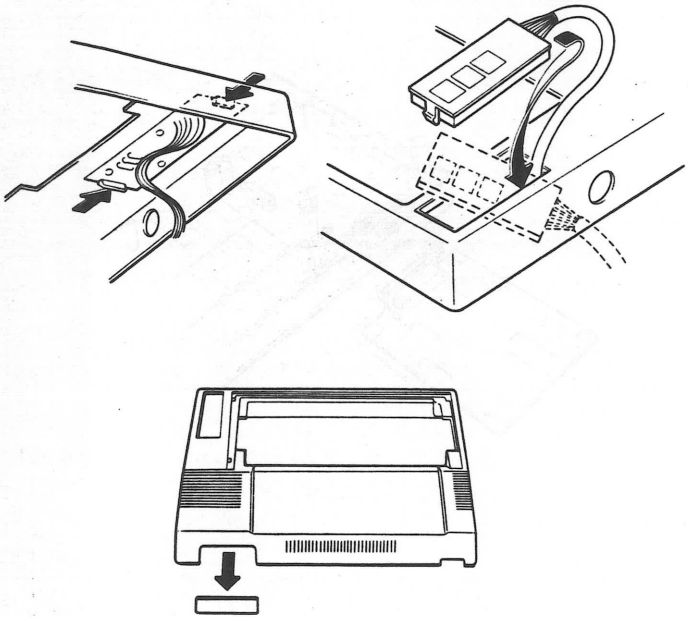
2. Take off the paper feed knob.
3. Remove the upper case retaining screws using a cross-head screwdriver. (Four screws on the 80-column models and six on the 136-column models.)

Note

The FX-800/1000 (FX-86e/286e) models have only one screw and two retaining clips on the 80-column models, and four clips on the 136-column models.

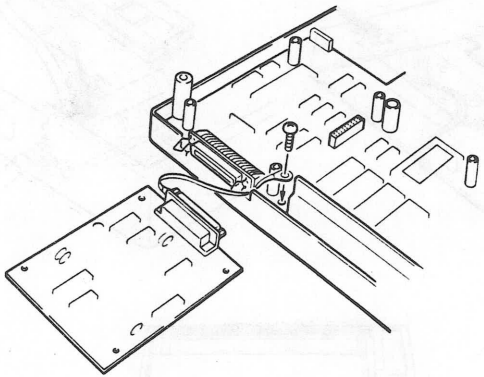


4. Partially raise the upper case. Reach under and detach the control panel by squeezing the two retaining clips together. Next, slip the panel back through the upper case.
5. Remove the upper case and detach the shield plate.

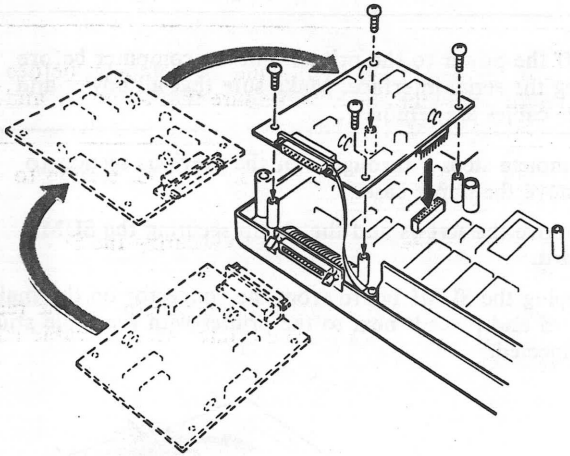


Note
If your printer has an extra board (called a SUMI board) piggy-backed on to the controller board, skip to the next section.

6. Remove the screw and washer from the pole to the left of the parallel connector. (They will not be needed again.)
7. Remove the FG (Frame Ground) screw.
8. Carefully place the interface board next to the printer as shown below. Connect the FG wire to the main board using the FG screw.



9. Holding the interface board level, rotate it clockwise into position and then carefully insert the connector pins into the mating connector on the main board.
10. Secure the board with the retaining screws provided.



11. Reassemble the printer.

FX printer with SUMI board

If your printer is equipped with a SUMI board piggy-backed on to the main board, then follow the procedures listed below when installing the optional interface. There is no difference in printer operation between printers with or without a SUMI board.

Caution
Turn off the power to the printer and the computer before installing the serial interface. Make sure that all power and interface cables are removed.

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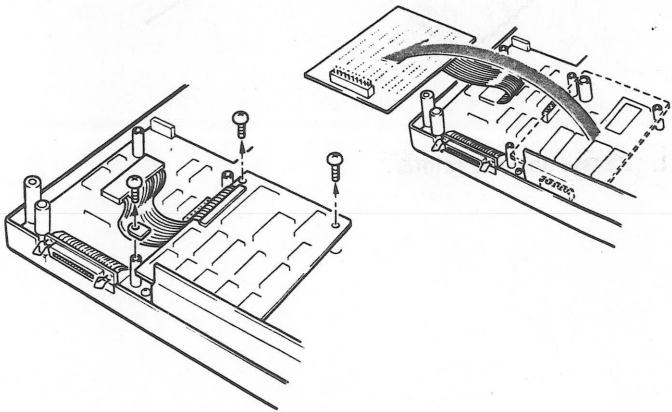
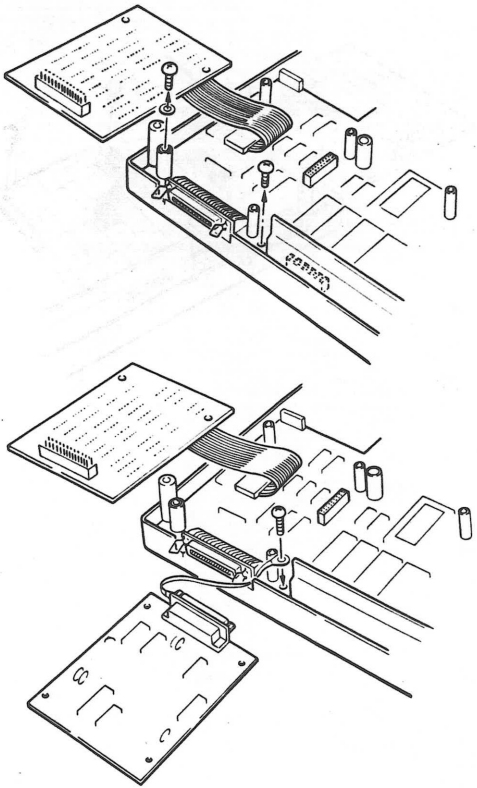
1. Complete steps 1 through 6 of the previous section to remove the upper case.
2. Remove the screws and the clamp securing the SUMI board.
3. Unplug the SUMI board from the connector on the main board and place it next to the printer with the cable still connected.

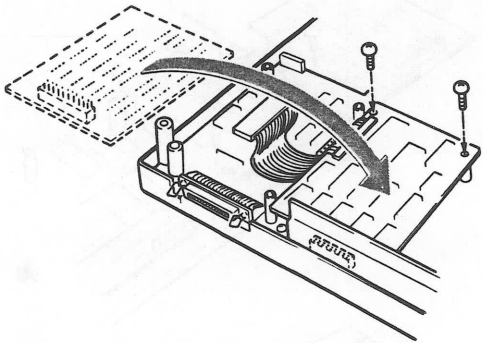


4. Remove the screw and washer from the pole to the left of the parallel connector.
5. Remove the FG screw.
6. Carefully place the interface board next to the printer as shown below. Connect the FG wire to the main board using the FG screw.

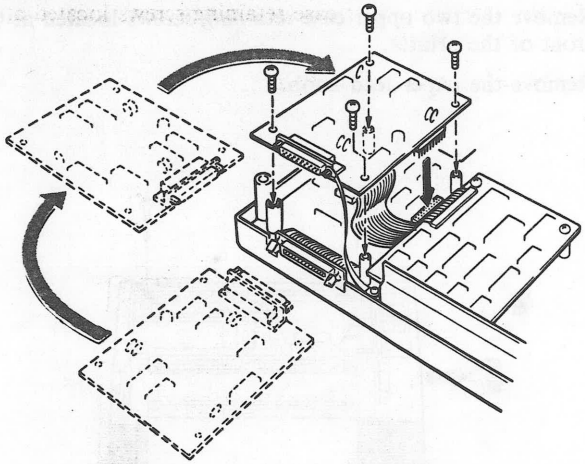


7. Reattach the SUMI board.

Note
Be sure to reinstall the SUMI board before continuing with the interface board installation.



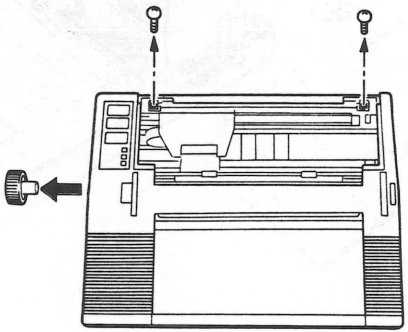
8. Holding the interface board level, rotate it clockwise into position and attach it to the main board. Make sure that the connector pins are properly inserted into the mating connector.
9. Secure the board with the retaining screws provided.



10. Reassemble the printer.

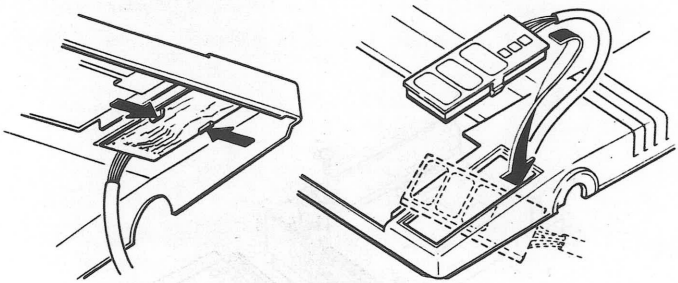
Caution
Turn off the power to the printer and the computer before installing the interface. Make sure that all power and interface cables are removed.

1. Remove the two upper case retaining screws located at the front of the printer.
2. Remove the paper feed knob.



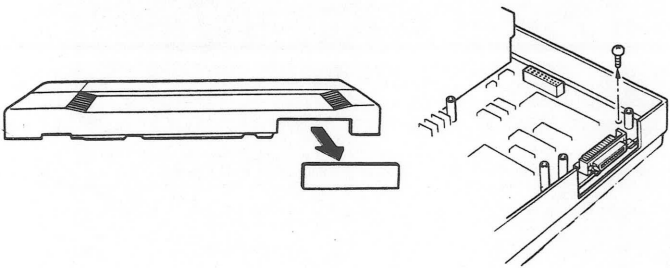
3. Partially raise the upper case of the printer. Reach under the case and detach the control panel by squeezing the retaining clips together.

4. Slip the control panel back through the upper case.

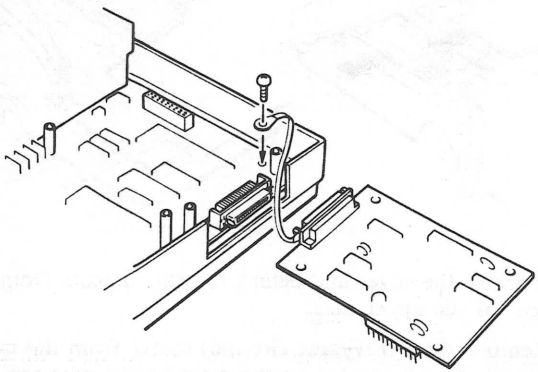


5. Remove the cover and detach the shield plate from the rear of the upper case.

6. Remove the FG (Frame Ground) screw from the main board. This is located on the main board near the back of the printer.

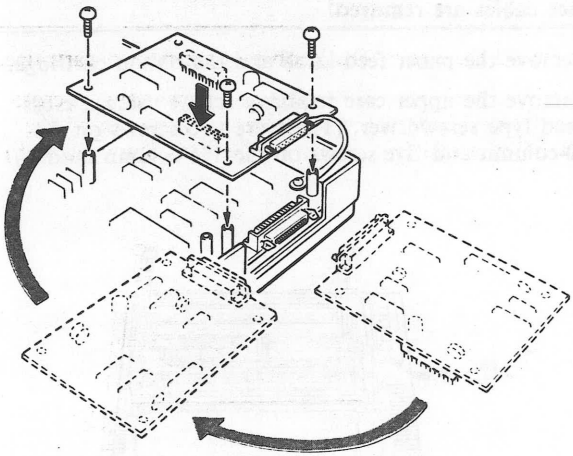


7. Carefully place the interface board next to the printer as shown below. Connect the FG wire to the main board using the FG screw.



8. Holding the interface board level, rotate it clockwise into position and then carefully insert the connector pins into the mating connector on the main board.

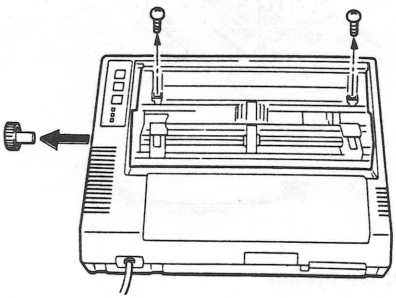
9. Secure the board with the retaining screws provided.



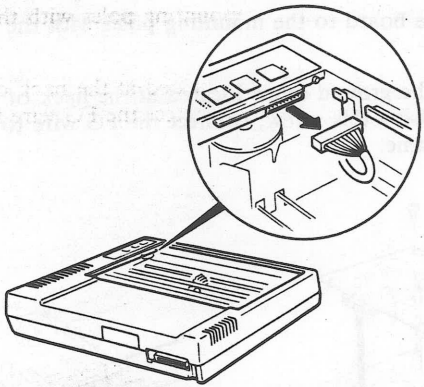
10. Reassemble the printer.

Caution
Turn off the power to the printer and the computer before installing the serial interface. Make sure that all power and interface cables are removed.

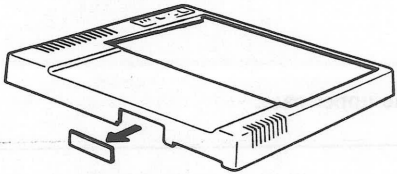
1. Remove the paper feed knob and the ribbon cartridge.
2. Remove the upper case retaining screws using a cross-head type screwdriver. (There are two screws on the 80-column and five screws on the 136-column model.)



3. Unplug the control panel cable from the control panel.



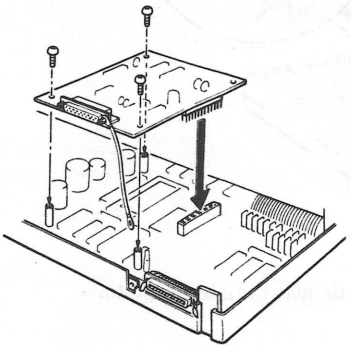
4. Lift off the upper case and detach the shield plate.

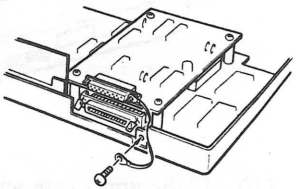


5. Attach the interface board, making sure that the connector pins are properly inserted and that the free end of the FG wire is outside the of printer case.

6. Secure the board to the mounting poles with the screws provided.

7. Remove the ground screw located at the back of the printer. Using this screw, connect the FG wire to the printer frame.





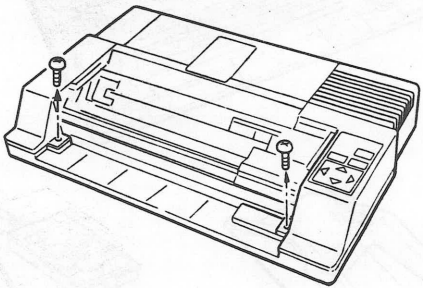
8. Replace the upper case.

Note

When replacing the upper case, take care not to pinch the FG wire between the upper and lower sections of the case.

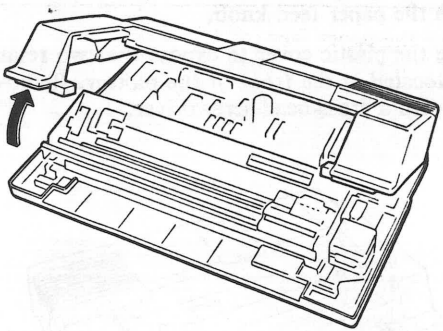
Caution
Make sure that power to the plotter and the computer is turned off. Then disconnect both the AC power and interface cables from the plotter.

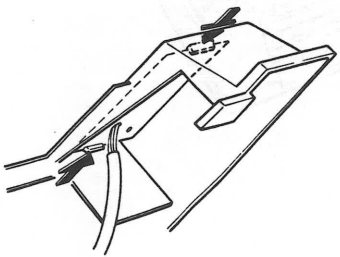
1. Remove the paper feed knob.
2. Remove the plastic cover to expose the two retaining screws located at the front of the plotter. Remove these screws with a cross-head screwdriver.

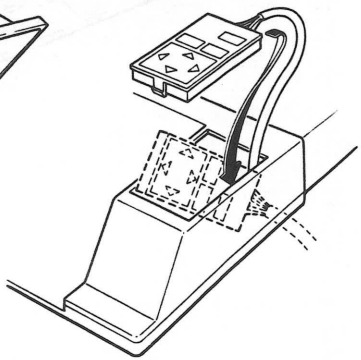


3. Partially raise the front of the upper case. Reach under the control panel and gently squeeze the two retaining clips together to detach the control panel from the upper case.

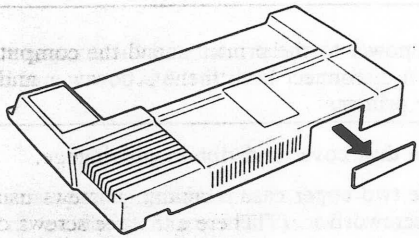
4. Slip the control panel back through the case opening.





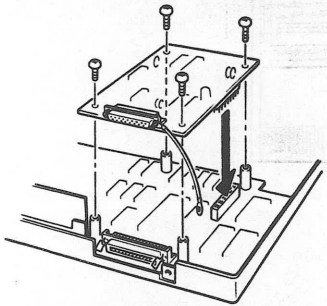


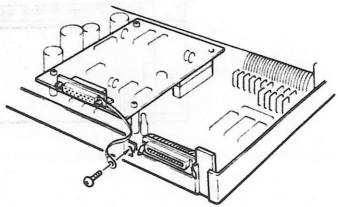
5. Lift off the upper case and detach the shield plate.



6. Attach the interface board, making sure that the connector pins match the mating connector on the main circuit board. Secure the board with the screws provided.

7. Remove the ground screw located at the back of the printer. Using this screw, connect the FG wire to the printer frame.



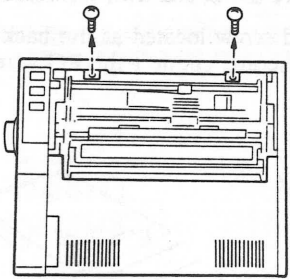


8. Reassemble the printer.

Note
When replacing the upper case, take care not to pinch the FG wire between the upper and lower sections of the case.

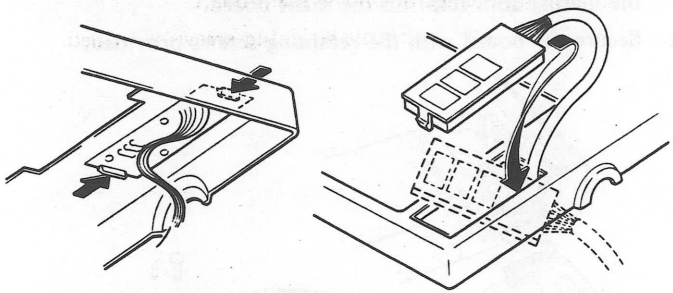
Caution
Make sure that power to the printer and the computer is turned off. Then disconnect both the AC power and interface cables from the printer.

1. Remove the dust cover and ribbon cartridge.
2. Remove the two upper case retaining screws using a cross-head type screwdriver. (There are three screws on the LQ-1000.)



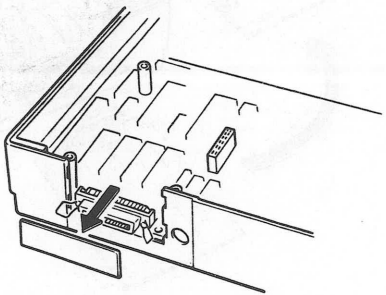
3. Partially raise the upper case being careful not to strain the cable connected to the control panel. Reach under the case and detach the control panel by squeezing together the two retaining clips.

4. Slip the control panel back through the upper case.



5. Remove the upper case.

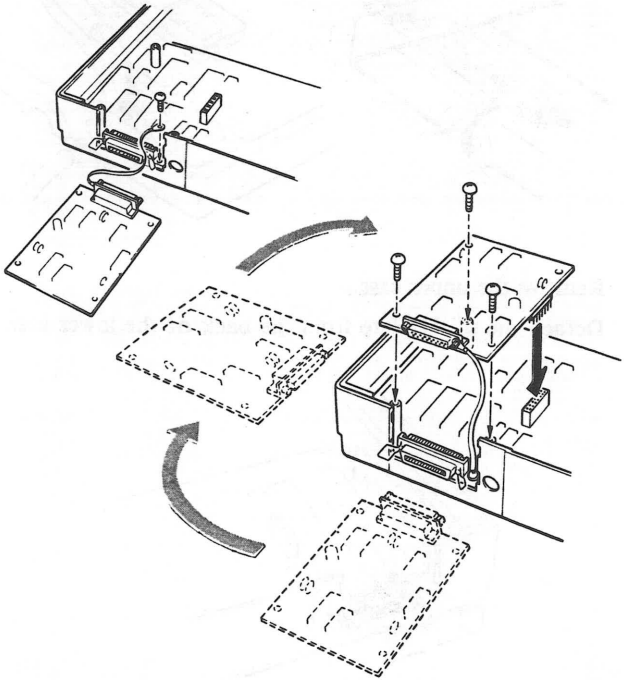
6. Detach the shield plate from the back of the lower case.



7. Remove the FG screw from the main board. Carefully place the interface board next to the printer as shown below, and connect the FG wire to the main board using the FG screw.

8. Holding the interface board level, rotate it clockwise into position and then carefully insert the connector pins into the mating connector on the main board.

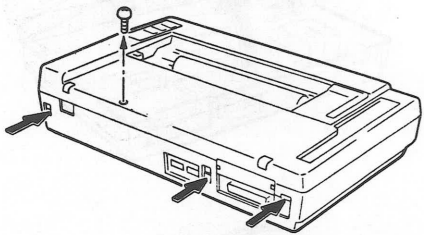
9. Secure the board with the retaining screws provided.



10. Reassemble the printer.

Caution
Make sure that power to the printer and the computer is turned off. Then, disconnect both the AC power and interface cables from the printer.

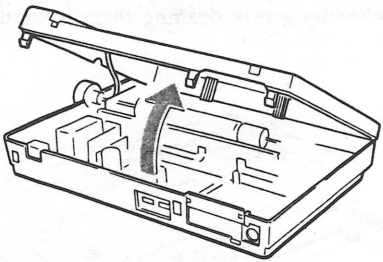
1. Remove the dust cover and ribbon cartridge.
2. Remove the screw retaining the upper case of the printer using a cross-head screwdriver.
3. With the printer's back facing you, unclip the three retaining clips by gently pushing them inward.

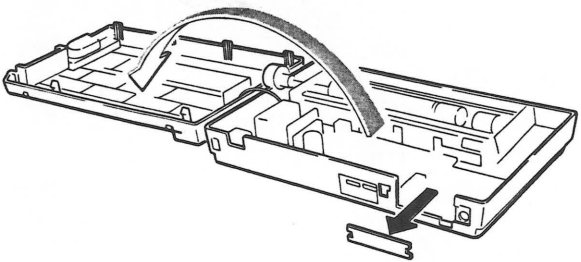


4. Partially raise the upper case from the back and release the hinges at the front edge. Be careful not to strain the control panel cable located on the side of the printer next to the paper feed knob.

5. Carefully turn the upper case upside down, following the direction of the arrows in the diagram below. Again, make sure not to strain the control panel cable.

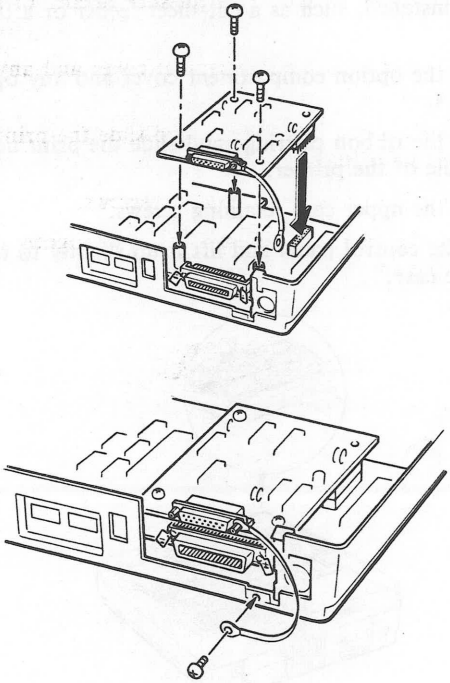
6. Remove the shield plate.





7. Attach the connector pins on the interface to the matching connector on the main board, and then secure the board with the screws provided.

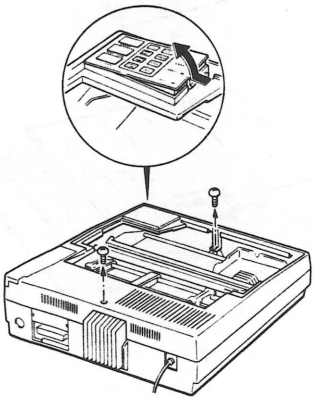
8. Remove the ground screw at the rear of the printer. Use this screw to attach the FG wire to the frame of the printer.



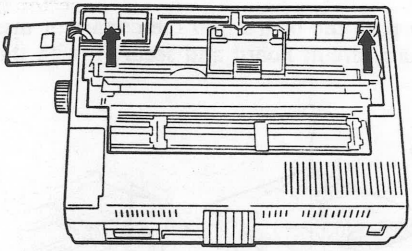
9. Reassemble the printer.

Caution
Turn off the power to the printer and the computer before installing the serial interface. Make sure that all power and interface cables are removed.

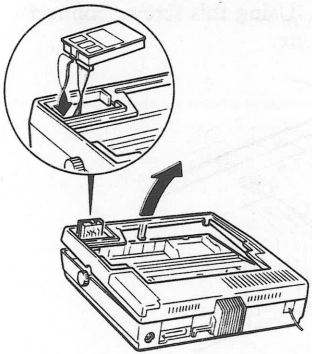
1. Remove the dust cover, paper guide, and any option that may be installed, such as a cut-sheet feeder or a tractor unit.
2. Remove the option compartment cover and any option cartridg' s.
3. Remove the ribbon cartridge and slide the print head to the middle of the printer.
4. Remove the upper case retaining screws.
5. Unclip the control panel and lift it up slightly to release it from the case.

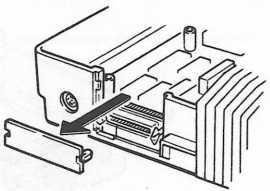


6. Position the control panel as shown below.
7. Gently press the two retaining clips to release the front of the edge of the upper case.



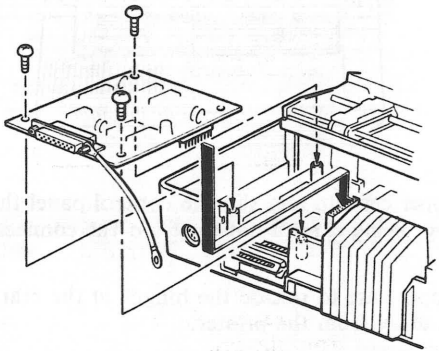
8. Tilt the upper case up and slip the control panel through the opening, being careful not to strain the connector cable.
9. Lift the upper case to release the hinges at the rear edge, then lift it away from the printer.
10. Remove the shield plate.



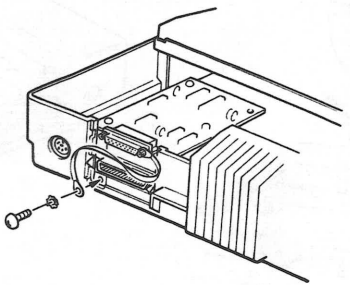


11. Insert the board beneath the printer mechanism following the direction indicated by the dotted lines. Be sure that the FG wire attached to the interface is outside of the printer case.

12. Carefully plug the board into the connector marked CN2 on the main circuit board and secure it with the screws provided.



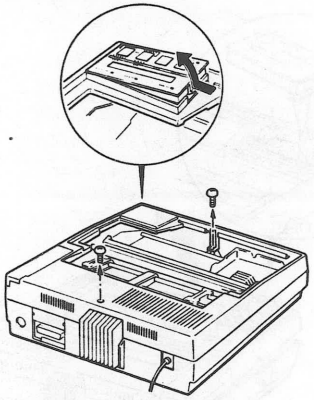
13. Remove the ground screw located at the rear of the printer, near the parallel port. Using this screw, connect the FG wire to the printer frame.



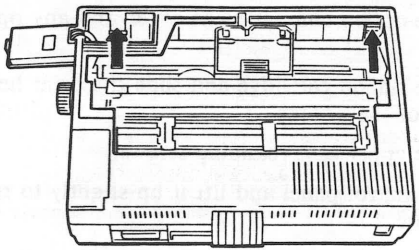
14. Reassemble the printer.

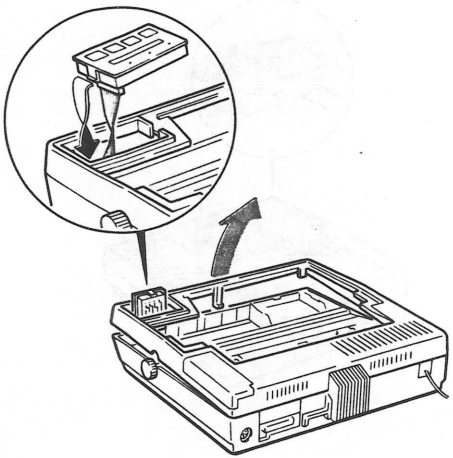
Caution
Turn off the power to the printer and the computer before installing the serial interface. Make sure that all power and interface cables are removed.

1. Remove the dust cover, paper guide, and any option that may be installed.
2. Remove the option compartment cover and any option cartridges.
3. Remove the ribbon cartridge and slide the print head to the middle of the printer.
4. Remove the upper case retaining screws.
5. Unclip the control panel and lift it up slightly to release it from the case.



6. At each side of the front panel there is a retaining clip, as shown below. Reach behind the cable and gently press these clips to release the front edge of the upper case.
7. Partially raise the upper case and slip the control panel through the opening.
8. Raise the upper case to release the rear hinges and lift it away from the printer.

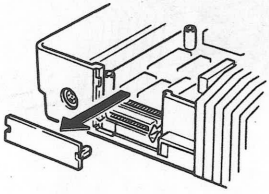


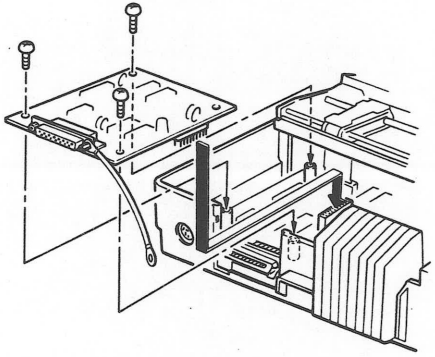


9. Remove the shield plate to allow access for the new interface connector.

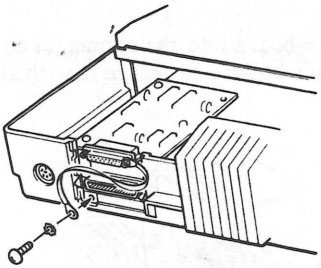
10. Insert the board beneath the printer mechanism following the direction indicated by the dotted lines. Be sure that the FG wire attached to the interface rests outside of the printer case.

11. Carefully plug the board into the connector marked CN2 on the main circuit board and secure it with the screws provided.





12. Remove the ground screw located at the back of the printer, next to the parallel port. Using this screw, connect the FG wire to the printer frame.



13. Reassemble the printer.

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FCC COMPLIANCE STATEMENT FOR AMERICAN USERS

This equipment generates and uses radio frequency energy and if not installed and used properly, that is, in strict accordance with the manufacturer's instructions, may cause interference to radio and television reception. It has been type tested and found to comply with the limits for a Class B computing device in accordance with the specifications in Subpart J of part 15 of FCC Rules, which are designed to provide reasonable protection against such interference in a residential installation. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient the receiving antenna
- Relocate the printer with respect to the receiver
- Plug the printer into a different outlet so that the printer and receiver are on different branch circuits.

If necessary, the user should consult the dealer or an experienced radio/television technician for additional suggestions. The user may find the following booklet prepared by the Federal Communications Commission helpful:

"Television Interference Handbook."

This booklet is available from the U.S. Government Printing Office, Washington, DC20402. Stock No. 004-000-00450-7.

WARNING

The connection of a non-shielded printer interface cable to this printer will invalidate the FCC Certification of this device and may cause interference levels which exceed the limits established by the FCC for this equipment. If this equipment has more than one interface connector, do not leave cables connected to unused interfaces.

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